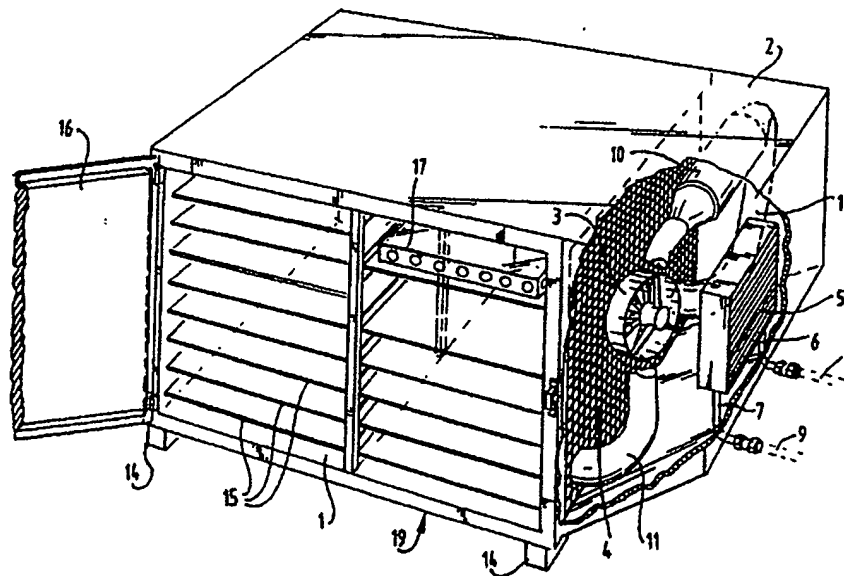


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(54) Title: APPARATUS FOR TRANSPORT OF WARM FOODSTUFFS



(57) Abstract

Container for transporting warm foodstuffs with a first closable space (1) for the foodstuffs for transporting, a second closable space (2) in thermal contact with a heat source (5), and means (3) for transporting air from said second space to said first space. Container wherein the first space and the second space are mutually adjacent and are mutually separated by an air-permeable partition (4), and the means for transporting air can comprise a fan (3). The heat source comprises for instance a heat exchanger (5) provided with a supply conduit (6) and a discharge conduit (7) for a heat transporting medium, in particular a radiator (5) accommodated in the second space and/or an electrical heating element or a combustion heater (10), in particular a combustion heater operating on motor fuel.

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APPARATUS FOR TRANSPORT OF WARM FOODSTUFFS

The invention relates to an apparatus for transporting warm foodstuffs which comprises a container.

Such an apparatus is known. Known containers consist for instance of heat insulating material and are frequently
5 used for transporting foodstuffs prepared in a restaurant to homes of customers. In this application the container is placed in or on a vehicle (car or motorbike).

The drawback associated with the known containers is that they retain the moisture rising from the steaming hot
10 food, causing it to precipitate again onto the food with the result that the quality of these dishes greatly diminishes.

Crispy foodstuffs or parts thereof such as the crust of a pizza are in danger of rapidly becoming mushy when transported in a known container. Arranging openings in the
15 known container in order to drain off moisture results in rapid cooling of the transported foodstuffs.

The object of the invention is to provide a container with which these drawbacks are not associated.

This object is achieved in accordance with the
20 invention with a container which comprises:

- a first closable space for the foodstuffs for transporting,
- a second closable space in thermal contact with a heat source,
- 25 - means for transporting air from said second space to said first space.

In a container according to the invention air is conditioned in the second space, in this case heated, for example by a combustion heater, and the conditioned air is
30 then carried to the first space in which the foodstuffs for transporting can be placed.

In one embodiment the first space and the second space are mutually adjacent and are separated by an air-permeable

wall. This wall can consist of perforated material or of closed material in which air holes are arranged, or can be air-permeable in other manner.

5 An embodiment in which the first and the second spaces are mutually adjacent is particularly compact. Because the partition wall between the first and the second space is air-permeable such an apparatus achieves in a simple manner that the air circulation in the first space is continuous and homogenous.

10 In a following embodiment the means for transporting air comprise a fan. It has been found that in such an apparatus with an air circulation forced by a fan foodstuffs not only remain warm during transport but also crispy fresh.

15 In a further embodiment the heat source is a heat exchanger provided with a supply and discharge conduit for a heat transporting medium.

The heat exchanger according to the latter embodiment is preferably a radiator which is accommodated in the second space and the supply and discharge conduits of which are provided with quick action couplings. Such an apparatus can
20 be used in simple manner in various places or in various transporting means, wherein the radiator can for example be connected to an already present hot water supply.

In yet another embodiment the heat source is a
25 combustion heater, in particular a combustion heater operating on motor fuel.

Such an apparatus is particularly suited for use in a delivery van, especially when this moreover comprises a radiator. The container is then placed on the loading floor
30 of the vehicle and the supply and discharge conduits from the radiator are connected to a hot water circuit of the relevant vehicle. When the vehicle motor is in operation the apparatus obtains the required heat from the vehicle motor and when the latter is switched off the combustion heater of the
35 container, for example a combustion heater operating on petrol or diesel, takes over the function of the radiator.

The application of an apparatus according to the invention is in no way limited to transport means for road transport. Such an apparatus can also be placed in ships,

trains and aircraft. In an embodiment eminently suited for electric rail transport the heat source is an electric heating element.

It has been found that a particularly good circulation
5 of conditioned air is obtained when the second space is provided with a sloping bottom rising in the direction of the air transport.

In an embodiment which is especially suitable for transporting foodstuffs with a relatively high moisture
10 content the container comprises means for discharging condensed moisture.

For applications in which relatively high demands are made in respect of air humidity the invention provides means for forced condensation of moisture from the transported air.
15 These means may be present either in the first or the second space or outside these.

The usefulness and convenience of use of the apparatus are increased still further when the container is provided on the underside with support elements, for example feet or
20 castor wheels.

In a preferred embodiment of an apparatus according to the invention the first space is substantially block-shaped and is at least partially enclosed on two opposite sides and on the bottom surface by the second space, wherein said
25 enclosed opposite sides are air-permeable and the bottom surface is closed.

In such an embodiment it is possible to achieve an optimal air circulation by placing for example a radiator and a fan under the closed bottom of the first space and to admit
30 the conditioned, in this case heated, air via one standing air-permeable side into the first space filled with foodstuffs and to discharge this air again via the opposite standing air-permeable side.

An apparatus provided with a combustion heater is
35 advantageously characterized by a thermostat regulator for controlling this combustion heater.

The advantages of a combustion heater with a thermostat regulator are optimally utilized for instance in an apparatus which also comprises a radiator which is connected to the hot

water circuit of a vehicle. When in such an apparatus the necessary heat is primarily supplied by the radiator the combustion heater provides the required heat when the vehicle motor is switched off and the hot water in the radiator thus
5 cools.

A thermostat regulator is preferably timer controlled.

A timer controlled thermostat regulator can be employed for instance in a transporting device placed in a vehicle in order to effect pre-heating of the container using the
10 combustion heater from a predetermined time prior to loading of the container and the departure of the vehicle. Using the timer controlled thermostat regulator the installation can also of course be switched off at a predetermined time.

According to the invention the apparatus can be
15 provided with a third closable space for cooled transport of foodstuffs.

A container which is provided with such a third space and a per se known cooling device is eminently suitable for transporting and delivering complete meals at serving
20 temperature.

The invention further relates to boxes provided with one or more air-permeable surfaces evidently intended for a transporting device according to the invention.

It has been found that the advantageous properties of
25 the apparatus can be utilized optimally when the foodstuffs are placed in boxes according to the invention, in particular when these boxes are placed in the container such that at least one air-permeable surface is placed substantially perpendicular to the feed direction of the warm air for
30 transporting.

The invention finally relates to a transport means that is characterized by an apparatus according to the invention described herein.

The invention will now be further elucidated in the
35 light of several embodiments with reference to the drawing.

In the drawing:

figure 1 shows a container in perspective view;

figure 2 shows a perspective view of a container disposed in a vehicle according to another embodiment according to the invention;

figure 3 shows a cut away perspective view of a third
5 embodiment of a container.

Figure 1 shows a container with first space 1, second space 2, a fan 3, an air-permeable wall 4, a radiator 5 with supply conduit 6 and discharge conduit 7 which are coupled with lines 8 and 9 respectively to the hot water circuit of
10 an existing installation (for instance of an automobile), heating device 10 with conduits for warm air 11 and air to be heated 12, upward sloping bottom part 13, support elements 14 on the underside of the container, sliding trays 15 (for example of stainless steel or plastic material) for the
15 foodstuffs for transporting (preferably in boxes with at least one air-permeable surface, which boxes are placed with the air-permeable surface perpendicular to the feed direction of the heated air), and finally a door 16 with which the first space can be closed off.

20 Figure 2 shows a container 27 placed in a delivery van 18 and again having a space 1 for the foodstuffs for transporting and a space 2 which in this embodiment extends beneath and to either side adjacently of the first space. The vertical partition walls 4 between the first and the second
25 space are completely open; they are only interrupted by the tray guides 23 for the trays 15 on which the foodstuffs 26 lie. The foodstuffs 26 are kept warm using a combustion heater 10 from which warm air is admitted into the second space via a supply conduit 11 running through the bottom 20
30 of the container 27, under the closed bottom 21 of the first space 1. The warm air spreads via the bottom 21 to the part of the second space 2 extending along the left-hand side wall of the first space 1. The warm air is carried via the left-hand air-permeable wall 4 along the trays 15 with foodstuffs
35 26 and is carried away via the right-hand air-permeable wall to the air discharge conduit 12 which protrudes through the right side of the container bottom 20 and which leads back to the combustion heater 10. An upstanding partition 22 between the bottom 20 of the container 27 and the bottom 21 of the

first space 1 effects a homogenous distribution and a correct flow direction of the conditioned air coming out of the supply conduit 11. The temperature of the air is controlled using a thermostat 24 which can be bridged when necessary by a time switch 25.

Figure 3 shows a container 28 which is a slightly adapted version of the container 27 of figure 2. The container 28 provided with walls 29, top panel 30 and bottom 20 of thermally insulating material comprises in the second space 2 under the bottom 21 of the first space a radiator 5 provided with a supply conduit 6 and a discharge conduit 7 and a fan 3 received in the standing partition 22. The conduits 6 and 7 can be connected with quick action couplings (not shown) to corresponding conduits in for example an automobile. The air in the container 28 is then conditioned by the combined action of the combustion heater 10 (not shown) and the radiator 5. The operation of a container 28 placed in a delivery van and the conduits 6, 7, 11, 12 of which are respectively connected to a hot water circuit and the combustion heater (not shown) of the vehicle is as follows. At a chosen time prior to loading of the container the combustion heater 10 is started using the time switch 25, as a result of which the container is pre-heated until the desired temperature set with the thermostat 24 is reached. The temperature is kept to the correct level using thermostat regulator 24 and combustion heater 10 until after the departure of the vehicle the hot water circuit of the vehicle has reached a sufficiently high temperature, at which point the radiator 5 in combination with fan 3 takes over the heating and circulating of the air completely or partially from the combustion heater 10. Because heat from the engine block is supplied to the radiator 5 through supply conduit 6 via heated cooling water, use of this radiator signifies a considerable energy saving; when an engine is running the heat from the engine block is in any case always available.

CLAIMS

1. Apparatus for transporting warm foodstuffs comprising a container,
characterized by
 - a first closable space for the foodstuffs for transporting,
 - a second closable space in thermal contact with a heat source,
 - means for transporting air from said second space to said first space.
2. Apparatus as claimed in claim 1, characterized in that the first space and the second space are mutually adjacent and are mutually separated by an air-permeable partition.
3. Apparatus as claimed in claim 1 or 2, characterized in that the means for transporting air comprise a fan.
4. Apparatus as claimed in any of the claims 1-3, characterized in that the heat source comprises a heat exchanger provided with a supply conduit and a discharge conduit for a heat transporting medium.
5. Apparatus as claimed in claim 4, characterized in that the heat exchanger comprises a radiator accommodated in the second space.
6. Apparatus as claimed in claim 4 or 5, characterized in that the supply and discharge conduits are provided with a quick action coupling.
7. Apparatus as claimed in any of the claims 1-3, characterized in that the heat source comprises a combustion heater, in particular a combustion heater operating on motor fuel.
8. Apparatus as claimed in any of the claims 1-3, characterized in that the heat source comprises an electric heating element.
9. Apparatus as claimed in one or more of the claims

1-8, characterized by a sloping bottom of the second space rising in the direction of the air transport.

10. Apparatus as claimed in one or more of the claims 1-9, characterized in that this comprises means for forced
5 condensation of moisture out of the transported air.

11. Apparatus as claimed in one or more of the claims 2-10, characterized in that the first space is substantially block-shaped and is at least partially enclosed by the second space on two opposite sides and on the bottom surface,
10 wherein said enclosed opposite sides are air-permeable and the bottom surface is closed.

12. Apparatus as claimed in one or more of the claims 6-11, characterized by a thermostat regulator for controlling the heating device.

13. Apparatus as claimed in claim 12, characterized by
15 a timer controlled thermostat regulator.

14. Apparatus as claimed in one or more of the foregoing claims, characterized by a third closable space for cooled transporting of foodstuffs.

15. Food transporting box, evidently intended for an
20 apparatus as claimed in any of the foregoing claims, provided with at least one air-permeable surface.

16. Transporting means, characterized by an apparatus
for transporting warm foodstuffs as claimed in any of the
25 claims 1-14.

FIG. 1

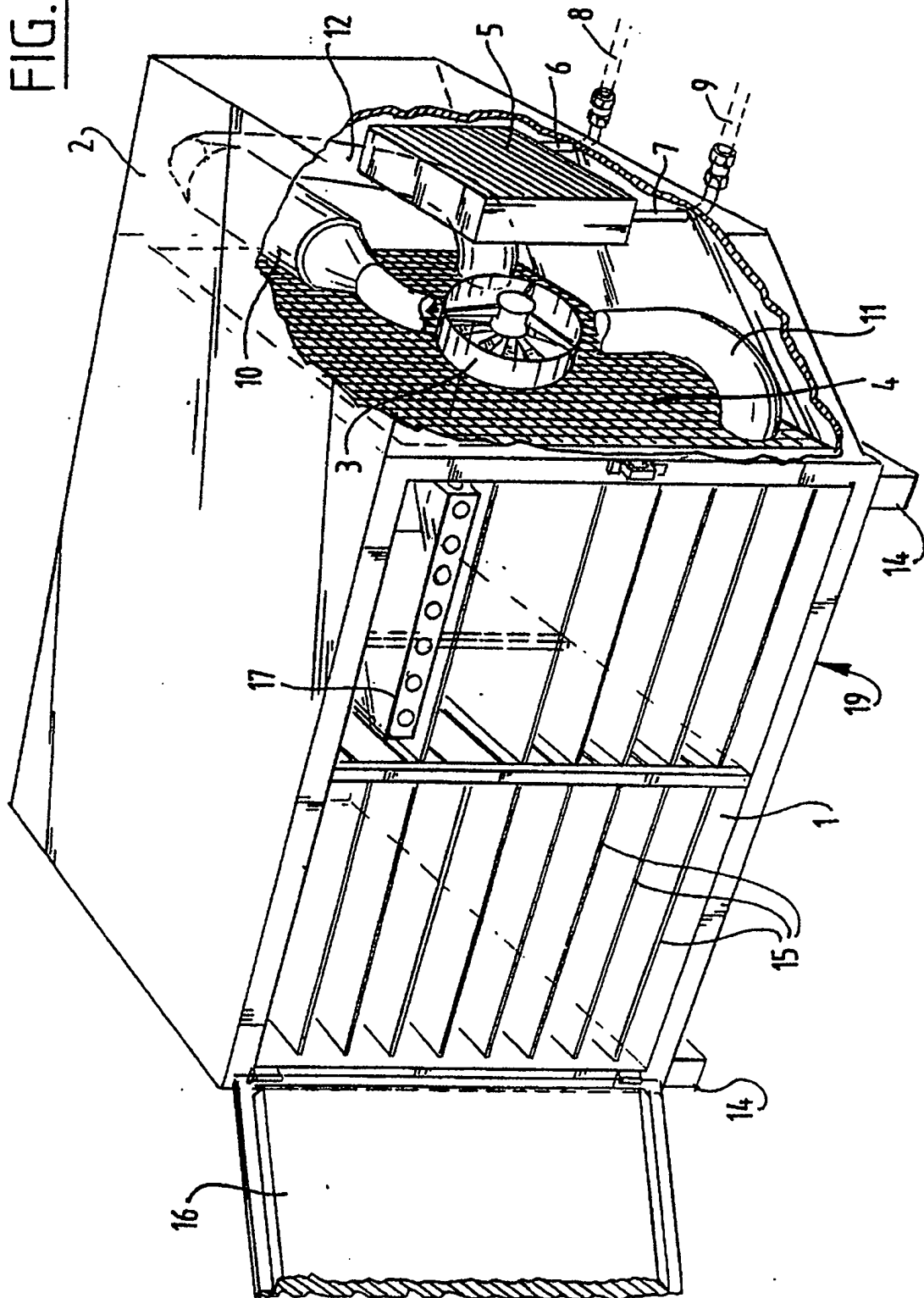
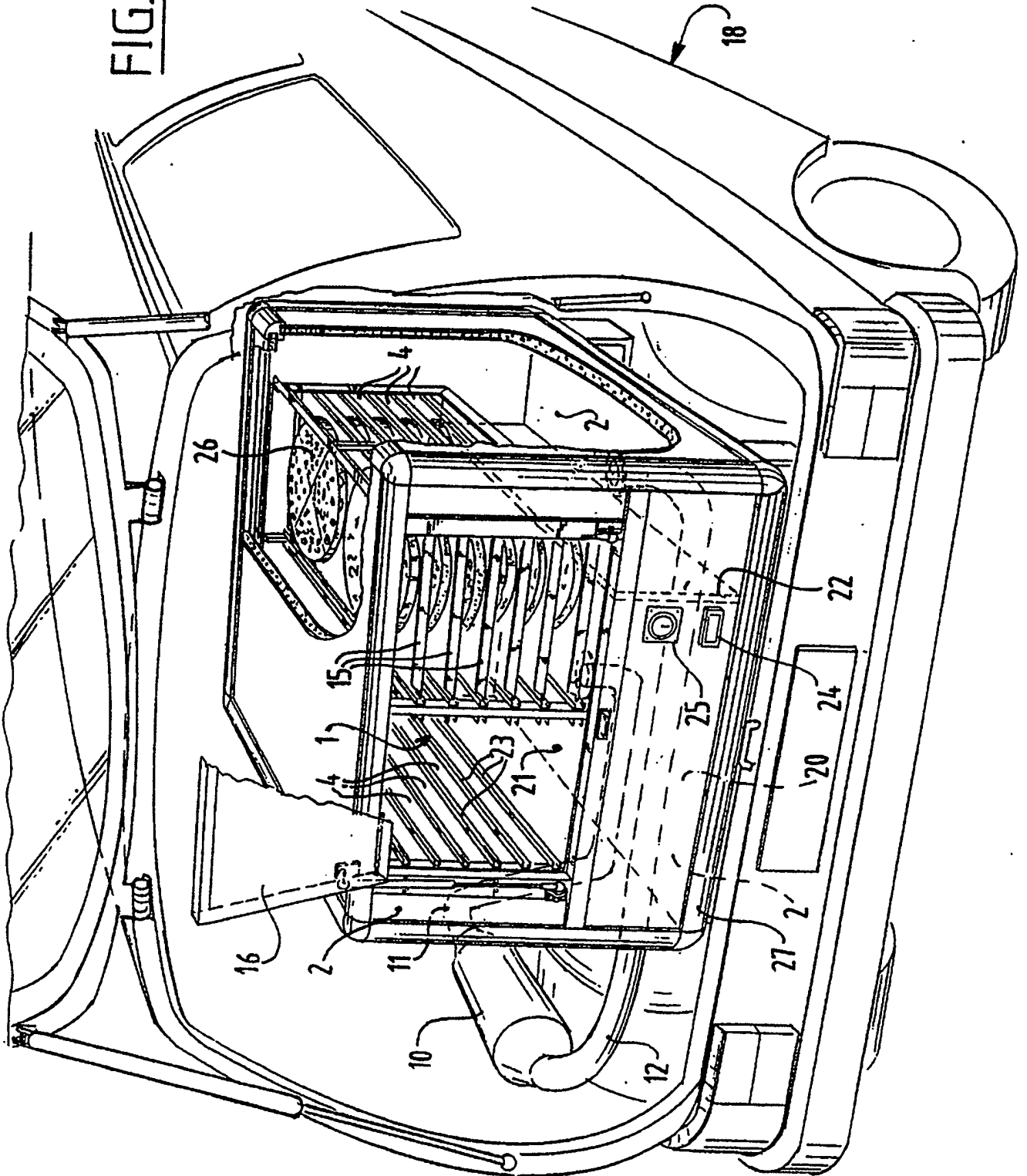


FIG. 2



3/3

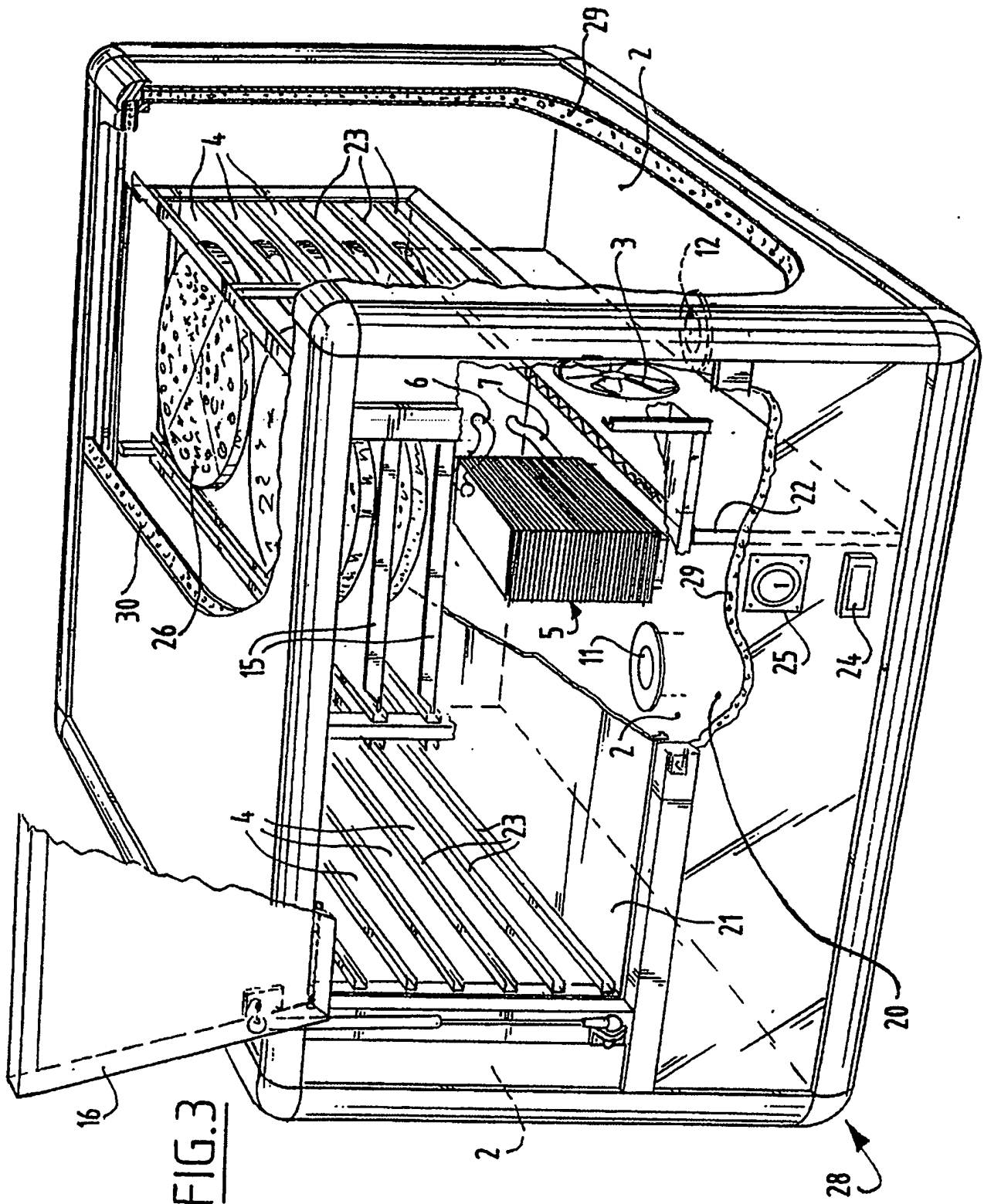


FIG. 3

SUBSTITUTE SHEET

Int.Cl. 5 A47J47/14; A47J39/00

Minimum Documentation Searched⁷

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Category °	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	DE,U,9 014 240 (PRIMUS GASTRONOMIEBETRIEBS GMBH) 20 December 1990	1-5, 7, 8, 10, 12, 16
Y	see page 2, line 1 - page 4, line 28; figure. ---	9, 13-15
X	EP,A,0 387 212 (R. MARCHETTI) 12 September 1990 see column 1, line 24 - line 49; figures 1,3 ---	1-3, 8, 11, 12, 15
X A	US,A,3 614 923 (N.W. THOMPSON) 26 October 1971 see column 2, line 6 - line 28; figures 1,2 ---	1-3, 11 7
Y	GB,A,1 448 668 (HOTPOINT LTD) 8 September 1976 see figures 4,5 ---	9
Y	DE,A,2 810 685 (R. BUTENSCHÖN) 20 September 1979 see page 3, line 24 - line 27 ---	13
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III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
Y	DE,U,8 526 356 (RICGNI CONDIZIONATORI SPA) 12 December 1985 see page 4, line 7 - page 5, line 14; figure 2 ---	14
Y	US,A,1 412 761 (J.F. TINGSTROM) 11 April 1922 see page 1, line 81 - line 103; figures 3,5 ---	15

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DE-U-9014240	20-12-90	EP-A- 0481352	22-04-92
EP-A-0387212	12-09-90	None	
US-A-3614923	26-10-71	None	
GB-A-1448668	08-09-76	None	
DE-A-2810685	20-09-79	None	
DE-U-8526356	12-12-85	FR-A- 2570810	28-03-86
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